

P R O J E C T facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

CLEAN coal
TECHNOLOGY

MEETING ENVIRONMENTAL REQUIREMENTS WHILE IMPROVING PLANT ECONOMICS—THE NOXSO PROJECT

PRIMARY PROJECT PARTNER

NOXSO Corporation
Bethel Park, PA

MAIN SITES

Alcoa Generating Corporation
Newburgh, IN

Olin Corporation
Charleston, TN

TOTAL ESTIMATED COST

\$82,800,000

COST SHARING

DOE \$41,400,000

Non-DOE \$41,400,000

Project Description

America's coal resources are far greater than the entire world's supply of oil. The only barrier to increased use of these resources is the impact that coal can have on the environment. The NOXSO project is demonstrating at a 150-megawatt Alcoa generating plant how an easily retrofitted technology can eliminate this barrier. The NOXSO technology reduces sulfur dioxide (SO₂) emissions by 98% and nitrogen oxides (NO_x) emissions by 75%, while allowing use of a low-cost, high-sulfur coal and creating a revenue-generating sulfur by-product in place of waste.

Compliance with environmental requirements and improved power-generation economics are achieved simultaneously. By participating in this project, Alcoa not only meets the requirements of the 1990 Clean Air Act Amendments, but takes advantage of the U.S. Environmental Protection Agency's (EPA's) SO₂ Allowance Trading Program. It is one of the first industrial units to do so. It will generate revenues from SO₂ allowances as well as from the sale of liquid SO₂ produced from sulfur by a burn-in-oxygen technology piloted by Calabrian Corporation. The by-product can be sold in quantities of up to 45,000 tons a year.

The project lowers plant operating costs in other ways, too—the project site, Alcoa's Warrick Unit #2, burns 500,000 tons per year of low-cost, high-sulfur coal, of which Indiana has reserves in excess of 675 million tons. Furthermore, the SO₂ and NO_x are removed simultaneously in one vessel, unlike conventional processes that require investment in separate vessels.

The process itself is simple: the technology is installed downstream of the combustor's particulate removal system, in the flue gas stream. The flue gas contacts a fluidized bed of sorbent (a sodium carbonate impregnated alumina bead developed and patented by NOXSO), which adsorbs both SO₂ and NO_x. Saturated sorbent is removed from the adsorber and heat-treated to remove NO_x, then treated with natural gas to remove SO₂. The regenerated sorbent is recycled for reuse. An environmentally superior new process produces liquid SO₂. Neither the NOXSO nor the burn-in oxygen technologies produce any waste by-products.

Program Goal

The NOXSO project has direct reference to the goal of the Clean Coal Technology Program: to facilitate commercialization of advanced coal-based technologies and develop opportunities for economic growth and export. It demonstrates how the efficiency and environmental performance of coal-fired power-generating systems can be increased to make them highly profitable, and to put them into compliance with the most stringent environmental regulations in the world.

